

## **Examining the Methods for Investigating Behavioral Clues of Special-Schooled Children**

### **Acknowledgements and credits**

Thanks to Professor Catharine Ward Thompson and Professor Peter Aspinall as research supervisors at the Edinburgh College of Art, for sharing their expertise on creating inclusive outdoor environments. Special thanks to Funds for Women Graduates (UK), for funding and making this research achievable and to all respondents, for their participation in this study.

Hazreena Hussein<sup>a</sup>, Md Nasir Daud<sup>b</sup>

University of Malaya

<sup>a</sup>Department of Architecture, <sup>b</sup>Department of Estate Management

Corresponding email: reenalambina@um.edu.my

### **Abstract**

This paper discusses the authors' use of a combination of methods to understand the engagement of special needs children with design features in sensory gardens of two schools in Britain. In addition to observation and behavior mapping, the authors interviewed landscape architects, teachers and therapists to anticipate the children's behavior when experiencing sensory gardens. We report how these groups' anticipations differed from what we observed. While the groups anticipated that aesthetic value relates significantly to users' behavior in the garden, we observed that sensory value has a stronger bearing on the behavior. The potential of this finding is important for design studies.

### **Introduction**

This paper presents the methods used in a study of how special schooled children interacted with a sensory garden. The therapeutic role of a garden environment has long been recognized, although there is little empirical study of the methods for evaluating how gardens support the well-being of users (Cooper Marcus, 2002; Hussein, 2002). Investigations of hospital gardens (Whitehouse et al., 2001) and inclusive parks (Moore and Cosco, 2007) offer insights into the impact of a garden on the users' well-being and behavior. A comparison between these two works and the study presented here is shown in Table 1.

	<b>Earlier Works</b>		<b>This Study</b>
<b>The work</b>	Whitehouse et al. (2001) Children's Hospital and Health Centre in San Diego	Moore and Cosco (2007) Kids Together Park in Cary	Hussein (2009) Sensory Gardens in the UK
<b>Research objective</b>	Investigated the effects of garden on patients, visitors and hospital staff	Examined the use of a universally designed park and how it was perceived by the users	Examined the design and use of sensory gardens in special schools used by children with special educational needs.
<b>Methods employed</b>	Observation and behavioral mapping Interviews Post-occupancy evaluation Visual analysis Survey	Observation and behavioral mapping Interviews Park visits with people with disabilities - -	Observation and behavioral mapping Interviews Walk-through interviews with the landscape architect - -

Table 1: Objectives and Methods: A Comparison of Whitehouse et al. (2001), Moore and Cosco (2007), and Hussein (2009).

### **Review of research methods on children with special educational needs**

Booth and Booth (1996) and Gilbert (2004) noted that although interview has been widely thought of as the best method in qualitative research, their own research showed that a number of challenges are presented when it comes to conducting interviews on children with learning difficulties. Not least is the issue of validity. To be valid, an interview must fulfill three elements (Lewis, 2002). First is authenticity which requires that opinions expressed are fair. Second, validity/credibility requires that opinions expressed are correct. Third, reliability/trustworthiness requires that opinions expressed are typical of what the person believes. In this respect, no amount of visual structure will make an interview possible for some people whose learning difficulties are more profound, as was also intimated by Nind (2008).

A formal survey is not a good alternative to interviews. There is no guarantee that a survey will perform effectively in eliciting information from special-needs children with whom more interaction may be needed (Hussein, 2002). Indeed, surveys are rarely employed in research of this nature. In McConkey and Mezza's (2001) survey of the employment

aspirations of people with learning difficulties, for example, questionnaires were completed by support workers - who acted as the intermediary in conveying disabled persons' views and preferences - rather than directly by the subjects themselves. This calls the reliability of the data into question.

Focus groups provide an environment that helps self-confidence, peer support and validation, enabling people with learning difficulties to contribute to research discussions (Cambridge and McCarthy, 2001; Nind, 2008). There are numerous challenges in using this approach on groups characterized by constrained verbal communication, sensory impairments or behavioral difficulties. These challenges can be mitigated, however, by using familiar places as meeting venues and working with human resource officers in organizing and recruiting participants (Barr *et al.* 2003).

Professionals, such as speech therapists, can assist researchers in gathering and interpreting information from people with profound learning difficulties (Whitehurst, (2006). Some researchers, however, question the authorship of data elicited this way (Grove *et al.*, 1999 and Rodgers, 1999). Researchers also have argued the importance of establishing a relationship as a first step towards eliciting the views of children with learning difficulties (Aitken and Millar, 2002; Rodger, 1999). Therefore, researchers have to establish the best medium through which communication takes place and conceptualize the message in a way that is meaningful to the recipient (Lewis and Porter, 2004). Limited or poor communication skills lead to difficulty with clarifying the meaning conveyed and thus to ambiguity in the interpretation of the response.

A growing body of evidence suggests that question and answer formats may be more constraining than narratives or use of statements (Lewis, 2002, 2004). A variety of augmentative and alternative communication supports have been suggested as visual methods, including electronic aids (power point), sign language, symbols systems (cue cards), photographs (Lewis, 2002), photo-voice (Booth and Booth, 2003), photo-elicitation (Mathers, 2004; Banks, 2001) and participatory photography (Aldridge, 2007). These methods involve using photographs to invoke remarks, bring back memory and generate discussion in the course of a semi-structured interview, and thus could assist in solving the verbal and communication problem between the researcher and people with learning difficulties. A low-tech and inexpensive visual communication resource that seems to be reliable is the 'Talking Mats' method (Murphy, 1997; Murphy and Cameron, 2001; Cameron *et al.* 2004; Germain, 2004; Murphy *et al.*, 2005; Whitehurst, 2006). This was designed to be used as a source of communication in conjunction with sign language jointly with facial expression and gesture (Cameron *et al.*, 2004; Whitehurst, 2006), and is particularly useful for students with autism and for the visually impaired, who rely on visual clues and textured clues respectively.

However, according to Brewster (2004), these visual methods may shift control to the participant, with the potential to make the range of responses limitless. This, in turn, makes the task of analyzing the views of people with learning difficulties, challenging, and increases the pressure on the researchers involved to validate their interpretation (Silverman, 2006). This is often best achieved by combining methods, which may serve to confirm or

elucidate an analysis. For example, Goodman (1998) combined focus groups and workshops with collage, drawings, role plays, videos, posters, photographs and pictures. Mark Boothroyd, a landscape architect who designed the sensory garden of Lyndale School in Liverpool, United Kingdom, in a personal interview, mentioned that the collage work, which the students produced is more useful than all the consultation data, questionnaire and reports because it shows exactly the kind of environment the users wanted.

Narrative is another method for enabling people with learning difficulties to share stories of their life experiences with others (Gilbert, 2004). The 'life history' approach (Goodley, 1996), including narrative and photography and pictorial representation, was developed to bring together insight and empathy of the individual, allowing others to make connections and to draw strength therefrom. The narrative method requires genuine commitment by the researcher to listening and facilitating the relating of experiences, for instance through group discussions.

### **Choice of the research methods**

The preceding discussion underscores the complexity of data collection when it involves children with special educational needs as respondents - particularly those with speech, language and communication difficulties. While there is the need to foster effective communications between researcher and the children, not many methods cater to this need. As an experiment, we attempted a focus group with the visually impaired at the Royal School of Blind in Edinburgh during the preliminary site study. The purpose was to gain an understanding of how students behave in the garden—an understanding which observation alone could not reveal. We thought that a focus group might provide a fuller picture of the use of the garden, as the information would come first-hand from the students. Teachers were not allowed to answer on behalf of the students in the focus group or to prompt the students with specific answers. Teachers could encourage the students by helping them to understand a question or by assisting them in grasping the answer. However, the method failed to deliver data on the features the students preferred for their sensory garden, on their experience in the garden, on their use of design features, or on the problems they encountered in the garden. We found that when we interviewed the children, particularly those with speech difficulty, about how they used the area in their garden, it was difficult to get first-hand information from them. Following Nind (2008), we chose neither of the visual methods because the process of getting permission from the parents of children with special educational needs to participate in a study was time consuming and would not have allowed us to conduct behavioral observation during May and July, the time of year with the best outdoor conditions.

This led to the construction of a methodology for studying the behavior of users with special needs in service to the design of sensory gardens.

#### *Face-to-face interview and walk-through interview*

A walk-through interview is an unstructured interview (Bechtel and Srivastana, 1978) which uses the detailed specification of environmental qualities as a prompt to help respondents articulate their reactions to a setting (Zeisel, 1981; Zimring, 1987). We used this method to

elicit information from the landscape architects, teachers and therapists. In order to benefit fully from the walk-through interview, the interviewer should gather up points, in terms of the environmental qualities, to a more detailed specification (Zeisel, 1981). This will allow the interviewer to use the respondent's personal definition of the setting in order to define important features.

#### *Observation and behavior mapping*

Behavior mapping is a recording technique that supports observation for studying environmental influences on behavior. It was developed by Ittelson *et al.* in 1970 (Bechtel and Zeisel, 1987:22) and is a method of understanding the engagement between users and the particular spatial setting. . Bechtel *et al.* (1987) noted that the aim of behavioral methods in environment behavior research is mainly to gain insight into research questions and problems. They described observation as a method having five dimensions: behavior, environment, time, observer and record of observation in relation to the mapping of an individuals' use of the setting. An empirical study of a children-environment relationship is best conducted by observing the children's situation and their actions in a particular context (Graue and Walsh, 1995). The same method is also appropriate when observing children with multiple and severe disabilities (McLinden and McCall, 2002). Hart (1979) utilised such a method when investigating environmental knowledge and when exploring children in their living environment. Laurie (1986) and Natsu and Padmavathi (2006) noted the importance of making observations in areas, which could reveal patterns of use. In order to understand the whole picture of an individual's involvement with his or her environment, it is not enough to know only what behavior occurs but also to know why it occurs and what its significance and meaning are (Lang, et al., 1974). Thus in terms of an analytical tool to evaluate sensory gardens, observation and behavior mapping comprise a single, complex method.

#### **Piloting the method**

A pilot study was conducted to identify difficulties in applying the methods and the modifications needed to address those difficulties.

For the initial approach, we referred to Golick's (2005) work to understand how the method could be carried out on the site practically. The essential instruments needed were an accurate scale map of the area, multi-coloured pens, a clipboard, a wristwatch, a digital camera and a tape recorder. The 'invention' of symbols to map the users' activity on a scaled base plan (a map of the property, drawn to scale, with houses, gardens and other landmarks properly indicated) with a matrix to record the details of the setting, the user characteristics and the type of activities undertaken are also crucial. According to Golick, it is important for the researcher to memorize the activity codes so the data will be collected systematically, as well as to note any significant behaviors that occurred during the observation period.

During the on-site investigation, we conducted interviews with the teachers, using a preliminary questionnaire, in order to understand the experience in terms of the benefits and problems as perceived by the adult carers (staff) in the sensory garden. This initial step also mapped both staff and student behaviors as they occurred within the setting, on a scaled base plan, using symbols. It entailed the recording of discrete behavioral observations as

they took place, categorizing them and then compiling a behavioral setting inventory (after Barker, 1968). After carrying out this initial step, it was possible to categorize the different types of main activities that were undertaken by the users.

The pilot test pointed to a number of difficulties. First was the questionnaire which was not self-explanatory enough for the teachers and thus had to be refined. In addition to that, there was uncertainty as to how to systematically record the physical activities that were observed during the observation period. There was also uncertainty over whether to conduct interviews with the special educational needs students because of their speech, language and communication difficulties. There was uncertainty in the timescale of users' activity and the optimum extent of the duration of observation (anything from 30-60 minutes) recorded per base plan. There were technical problems, such as insufficiency of the scaled base plan and matrix; and more binder clips were needed due to the windy weather. Most importantly, there was confusion in the sequence of methods as to whether to conduct the interviews, or the observation and behavior mapping, first.

A clear outcome of the pilot study was the need for information about the environment from local specialists, before undertaking the observation and behavior mapping. The sequence, then, was (1) interviews and walk-through interviews with the landscape architects, teachers and therapists; and (2) a systematic series of observations and behavior mapping (see Table 2).

## Method

## Objective

Interview with the landscape architects	To understand the design process, design intentions and to find out challenges the landscape architect had to deal with.
-----------------------------------------	--------------------------------------------------------------------------------------------------------------------------



Walk-through interview with the landscape architect in the sensory garden	To allow subsequent assessment of whether users utilized areas and features in the way intended by the landscape architect.
---------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------



Interview with the teachers and therapists	To enquire into their experience of and benefits in having the sensory garden; to assess the garden features and any problems identified in the sensory garden.
--------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------



Observation and behavioral mapping	To understand how users behave; to categorize all the different types of behavior.
------------------------------------	------------------------------------------------------------------------------------

Table 2 shows the sequence of methods used for data collection.

The questionnaires were simplified into structured interviews and made into four sets, i.e. two sets for the landscape architects and one set each for the teachers and therapists. Following Golicnik's work (2005), a decision was made to record the users' activity in four timescales of less than 1 minute, 1–2 minutes, 2–5 minutes, and more than 5 minutes. In order to avoid too much data packed into the one, scaled base plan, the observation and behavior mapping was planned to be conducted over fourteen separate thirty-minute periods, on different days, and at different times of the day. This is further explained in the 'Execution of the methods' section below.

### **Execution of the methods**

The data collection started with a two-session interview of the landscape architect. The first session was undertaken at a place of the architect's choice while the second involved a walk-through of the sensory garden.

In exploring the benefits of having a sensory garden as part of a school's special education environment, we interviewed the teachers and therapists on any problems the students had encountered when engaging with the features of the garden. This interview involved a standard questionnaire followed by a systematic series of observations and behavior mapping. We observed the users of the sensory garden to see if they understood what was going on, in terms of how the users, especially some particular children, behaved and how long they spent in the garden.

After the interviews and walk-through interviews with the landscape architects, teachers, and therapists were complete, observation and behavior mapping of on-site activities began. This data gathering was conducted in May and July, for seven consecutive working days each month and the period of observation was chosen to try to ensure that the daily variations in behavior could be observed. The data was then recorded continuously from 8.30am to 3.30pm on weekdays, during the opening hours of the school during the term. We took photographs but avoided shots of the users in observance of the school policy. The behavior mapping data were the main focus of the study. The results are shown in Figures 1 and 2.

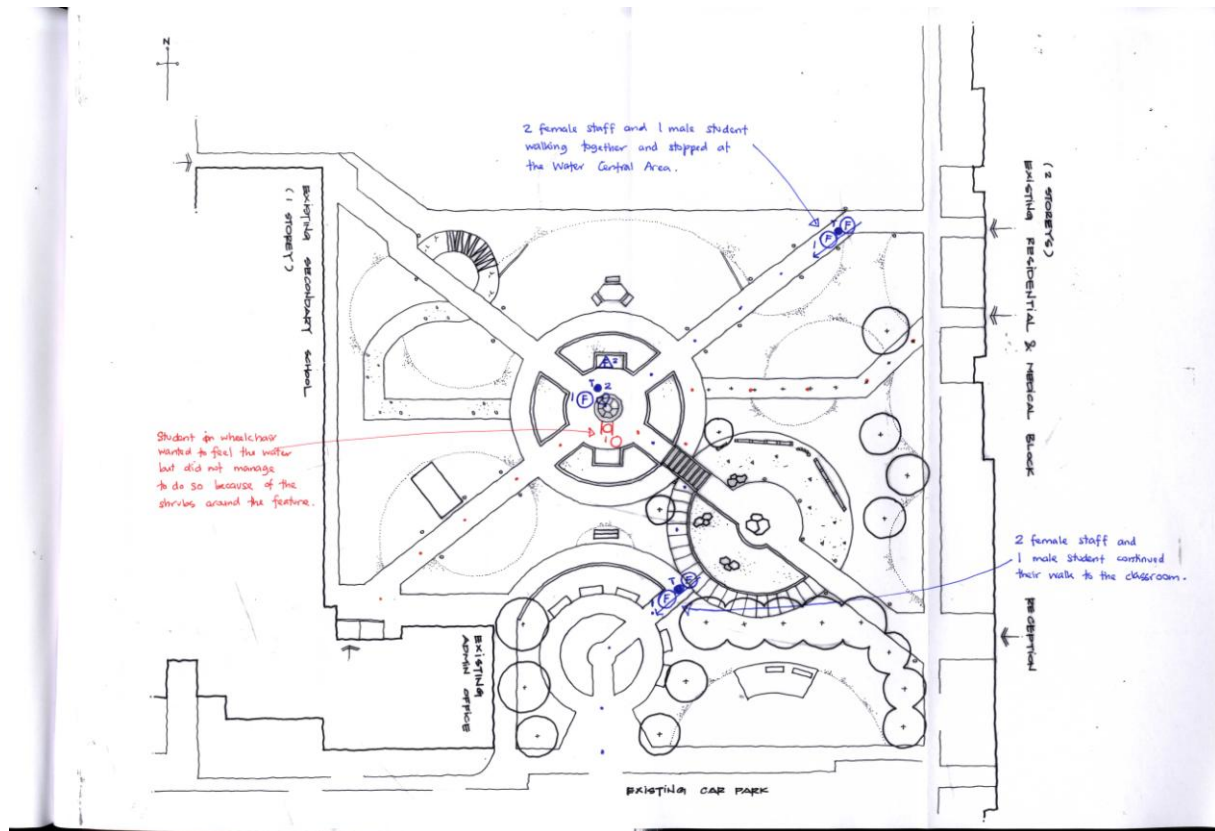


Figure.1: An accurate scale plan of a case-study sensory garden was obtained. Zones and site boundaries were first established, according to the landscape architects' design theme.



**A3 size sheet no.2: Behavioural Mapping Symbols**

SYMBOL	ACTIVITIES	FEMALE(outline)		MALE (solid)		NOTES
		StudenT	Staff	Staff	StudenT	
	Walking / Passing through					
	Walking fast					
	Walking together		2		1	Less than 1 min.
	Walking and talking					
	Walking with wheelchair	1	1			Less than 1 min.
	Stopping / Standing					
	Stop/Stand and talking					
	Sitting		1			Fear of getting wet. (1-2 min)
	Sitting together					
	Sitting and talking					
	Playing sensory equipment		1		1	at water feature (less than 1 min)
	Lying down					
	Singing					
	Walking with cyclist					
	Running					
	Walking with walkframe					

Site: RSDCO

Date: 8th MAY '07

**Time:**

8.30-9.00am  
9.00-9.30am  
9.30-10am  
10.00-10.30am  
10.30-11.00am  
11.00-11.30am  
11.30-12.00pm  
12.00-12.30pm  
12.30-1.00pm  
1.00-1.30pm  
1.30-2.00pm  
2.00-2.30pm  
2.30-3.00pm  
3.00-3.30pm

**Time scale:**

1=less than 1min  
2=1-2min  
3=2-5min  
4=more than 5min

**Weather conditions:**

Windy/Breezy  
Rainy  
Damp/Dry  
Cloudy/Sunshine

**Environmental Qualities that support certain Affordances**

ENV. QUALITIES	AFFORDANCES	OCCURANCE	FEMALE(outline)		MALE (solid)		NOTES
			StudenT	Staff	StudenT	Staff	
Flat surfaces	Walking	Lawn, Rubbery, Pathway.		3	1		+ 1 wheelchair user.
Smooth/rough surfaces		Slope, decking – boardwalk, vaporised trail – gravel, raised beds.					
Graspable/detached objects		Animals: bees, butterflies, birds, slugs, cats, tadpoles. Plants: herbs, shrubs, moss, climbers, trees.					
Attached objects		Textured wall, boulders, lighting bollard, wood edge, talking tubes, sound stimuli.					
Non-rigid, attached objects		Musical instruments; pipes, chimes, artworks.					
Climbable features		Log, balancing beam, rock sculpture.					
Shelter		Willow tunnel, covered tunnel, building.					
Mouldable materials		Sand, chipping.					
Water	Playing, scooping, splashing	Water feature, water channel.			1		1-2 min.
Microclimate		Thunder, rain water, sun, wind.					

Figure 2: Behavior mapping symbols were used to record observed behavior with an identification of the setting (where and when observation took place; and weather conditions), user types (who was observed: student or staff and the gender of users) and the

type of activities (what users were doing; and how long they spent doing the activities).

In the two special schools selected for the case studies, there was no set time for the teachers, therapists and children to use the sensory garden. Children had their own individual timetables and were free to use the garden as they wished, with the help of their adult carers. However, children were not allowed to wander around the garden by themselves. As a result, we made a decision to record and to observe all users who utilized the garden, in a specific observation period.

Behavior mapping records the users' movement (using symbols) from the time they enter the sensory garden until they leave the setting, which includes coding each type of user (gender and users' role: student or staff). This is by observing (from a distance) and recording the location of main activities the users undertook, simultaneously with the features engaged by the users, within the four timescales, on the scaled base plan. The authors stayed as invisible as possible from the users, especially from some particular children because, according to their adult carers, strangers could attract those students' attention and this would influence the behavioral mapping data. An example of the observation and behavior mapping as recorded in one thirty-minute period is shown in Figures 1 and 2 and is described in our notes as follows:

Description: It was a sunny morning. Two female staff and a hearing-impaired male student walked together (main activity) from *Green Space Two* and stopped at the *Water Central Area*. The water feature offered the potential for hands to be splashed about in it. A female teaching assistant had a fear of getting wet at the water feature<sup>1</sup>. She was sitting on the seat while another female teacher and a male student, were busy playing with the water. Suddenly, the student scooped up the water with his hands<sup>2</sup> and splashed it on his teacher. After being at the *Water Central Area* for less than two minutes, three of them continued their walk to the classroom, via *Asteroid Arts Garden* and *Parents Waiting Area*. On another occasion, students in wheelchairs wanted to feel the water but did not manage to do so because of the shrubs around the feature. This is evidence that an environment or an object can be looked at in relation to the individual's qualities such as children's physical skills or bodily proportions, social needs and personal intentions are matched with the environmental features (Kytta, 2002, 2003, 2006).

<sup>1</sup> Induce feelings of avoidance, danger, escape and fear (Heft, 1999; Kytta, 2003).

<sup>2</sup> An environment of what the children encountered during their independent mobility, perception and engagement with the environmental features (Heft, 1988, 1999; Kytta, 2002, 2003, 2004, 2006).

## Conclusion

This study has constructed a methodology based on the methods from Whitehouse *et al.* (2001) and Moore and Cosco's research (2007). We further developed the methodology in the context of a sensory garden and showed how it can be employed in this study. Whitehouse *et al.* (2001) carried out a post-occupancy evaluation, visual analysis, behavior observations, surveys and structured interviews, while Moore and Cosco (2007) employed methods of behavior observations, park visits with people with disabilities, setting observations and interviews with users, and we applied some of these methods. At the same time, we innovated by introducing the element of interviews and walk-through interviews with the

landscape architects of the sensory gardens. This turned out to be very useful. We demonstrated that the methodology is applicable in two special needs schools in Britain. It remains to be seen whether similar methods can apply seamlessly across different contexts where variations in climate and culture may affect the behavior of special-schooled children.

The divergence between what the landscape architects, teachers and therapists anticipated (during the interviews) regarding how students would behave and what the authors recorded during the observation periods in case study sensory gardens is important for design studies. While the groups anticipated that users' behavior in the garden was significantly influenced by aesthetic values, we observed that the behavior was persuaded more by sensory values. This showed in the elements such as water features and raised planters, which produced unanticipated behavior. We learned that the composition of the features and the spatial design of the sensory garden enabled particular users' engagement and usability of the garden. For example, designers should ensure that all users are offered a variety of activities and engage with features, minimizing barriers to allow users full access to the garden.

To conclude, the study has shown that the structured combining of individual interviews, walk-through, observation and behavior mapping provides a new and tested approach for investigating the behaviors of special schooled children in the context of sensory garden. These methods were appropriate for elucidating the issues that the users had to deal with when using the sensory garden, which areas in the garden were utilized by the users and the frequency of this use, and why users engaged with the features.

## References

Aldridge, J. (2007) 'Picture this: The use of participatory photographic research methods with people with learning disabilities'. *Disability and society*, 22 (1). pp.1-17.

Aitken, S. And Millar, S. (2002) *Listening to children with communication support needs*. Sense Scotland.

Banks, M. (2001) *Visual methods in social research*. London: Sage Publications.

Barker, R. (1968) *Ecological Psychology: Concepts and methods for studying the environment of human behavior*. California: Stanford University Press.

Barr, O., McConkey, R. and McConaghie, J. (2003) 'Views of people with learning difficulties about current and future accommodation: The use of focus groups to promote discussion'. *Disability and society*, 18 (5). pp.577-597.

Bechtel, Robert B. And R.K. Srivastana (1978) 'Post occupancy evaluation of housing'. Report submitted to the Department of Housing and Urban Development in Craig M.Zimring and Janet E.Reinzenstein *Post occupancy evaluation: An overview*. Environment and Behavior, 12(4), December 1980.

Bechtel, Robert B., Marans, Robert W. and Mitchelson, W. (1987) *Methods in environmental and*

*behavioural research*. New York: Van Nostrand.

Bechtel, Robert B. and Zeisel, J. (1987) 'Observation: The world under a glass'. In Bechtel, Robert B., Marans, Robert W. and Mitchelson, W. (eds.) *Methods in environmental and behavioural research*. New York: Van Nostrand.

Booth, T. and Booth, W. (1996) 'Sounds of silence: Narrative research with inarticulate subjects'. *Disability and society*, 11 (1). pp55-69.

Booth, T. and Booth, W. (2003) 'In the frame: Photovoice and mothers with learning difficulties'. *Disability and society*, 18 (4). pp431-442.

Brewster, S.J. (2004) 'Putting words into their mouth? Interviewing people with learning disabilities and little/no speech'. *British journal of learning disabilities*, 32 (4), pp.166-169.

Cambridge, P. and McCarthy, M. (2001) 'User focus groups and best value in services for people with learning difficulties'. *Health and social care in the community*, 9(6). pp476-489.

Cameron, L., Watson, J. and Murphy, J. (2004) 'Talking mats: A focus group tool for people with learning disability'. *Communication matters*, 18, pp.33-35.

Cooper Marcus, C. (2002) 'Postoccupancy evaluation and the design of hospital gardens'. In Shoemaker, Candice A. (ed.) *Interaction by design: Bringing people and plants together for health and well – being. An international symposium*. Ames: Iowa State Press, pp.219-220.

Germain, R. (2004) 'An exploratory study using cameras and talking mats to access the views of young people with learning disabilities on their out-of-school activities'. *British journal of learning disabilities*, 32 (4). pp170-174.

Gilbert, T. (2004) 'Involving people with learning disabilities in research: Issues and possibilities'. *Health and social care in the community*, 12 (4). pp.298-308.

Golicnik, B. (2005) *People in Place: A configuration of physical form and the dynamic patterns of spatial occupancy in urban open public spaces*. Unpublished Doctorial, Edinburgh College of Art, Edinburgh.

Goodley, D. (1996) 'Tales of hidden lives: A critical examination of life history research with people who have learning difficulties'. *Disability and society*, 11 (3). pp.333-348.

Goodman, K. (1998) 'Service user involvement'. In Burton, M. and Kellaway, J. (eds.) *Developing and managing high quality services for people with learning disabilities*. Aldershot, Ashgate. pp257-269.

Graue, M. Elizabeth and Walsh, Daniel J. (1995) 'Children in context: Interpreting the here and now of children's lives. In Hatch, J.A. (ed.) *Qualitative research in early childhood settings*. Westport: Praeger Publishers. pp.135-154.

Grove, N., Porter, J., Bunning, K. and Olsson, C. (1999) 'See what I mean: Interpreting the meaning of communication by people with severe and profound learning difficulties: Theoretical and methodological issues'. *Journal of Applied Research in Intellectual Disabilities*, 12 (3), pp190-203.

Hart, R. (1979) *Children's experience of place*. New York: Halstead Press.

Heft, H. (1988) 'Affordances of children's environments: A functional approach to environmental description'. *Children's environments quarterly*, 5 (3), pp.29-37.

Heft, H. (1999) 'Affordances of children's environments: A functional approach to environmental description'. In Nasar, Jack L. and Preiser, Wolfgang F. E. (eds.) *Directions in person - Environment research and practice*. Aldershot: Ashgate. pp.43-69.

Hussein, H. (2002) 'Parks for all'. In the proceedings of *International Federation of Park and Recreation Administration (IFPRA Asia – Pacific Congress)*. Singapore.

Hussein, H. (2009) *Therapeutic Intervention: Using the sensory garden to enhance the quality of life for children with special needs*. Unpublished Doctorial, Edinburgh College of Art, Edinburgh.

Kytta, M. (2002) 'Affordances of children's environments in the context of cities, small towns, suburbs and rural villages in Finland and Belarus'. *Journal of environmental psychology*, 22 (1), pp.109-123.

Kytta, M. (2003) *Children in Outdoor Contexts: Affordances and independent mobility in the assessment of environment child friendliness*. Unpublished Doctorial, Helsinki University of Technology, Helsinki.

Kytta, M. (2004) 'The extent of children's independent mobility and the number of actualised affordances as criteria for child-friendly environments'. *Journal of environmental psychology*, 24. pp.179-198.

Kytta, M. (2006) 'Environmental child-friendliness in the light of the Bullerby Model. In Spencer, C. and Blades, M. (eds.) *Children and their environments – Learning, using and designing spaces*. Cambridge: Cambridge University Press. pp.141-158.

Lang, Jon T., Burnette, C., Moleski, W. and Vachon, D. (1974) *Designing for human behavior: Architecture and the behavioural sciences*. Pennsylvania: Dowden, Hutchinson and Ross, Inc. p277.

Laurie, M. (1986) *An introduction to landscape architecture*. New York: Elsevier.

Lewis, A. (2002) 'Accessing through research interviews, the views of children with difficulties in learning'. *Support for learning*, 17 (3), pp.111-116.

Lewis, A. (2004) 'And when did you last see your father?' Exploring the views of children with learning difficulties/disabilities'. *British Journal of Special Education*, 31 (1), pp4-10.

Lewis, A. and Porter, J. (2004) 'Interviewing children and young people with learning disabilities: Guidelines for researchers and multi-professional practise'. *British journal of learning disabilities*, 32 (4), pp.191-197.

Mathers, A. (2004) 'Participation of people with learning disabilities in the landscape design process of urban green spaces'. In *the proceedings of OPENSpace: People Space Conference*. Edinburgh.

McConkey, R. and Mezza, F. (2001) 'Employment aspirations of people with learning disabilities attending day centres'. *Journal of intellectual disabilities*, 5 (4), pp309-318.

McLinden, M. and McCall, S. (2002) *Learning through touch: Supporting children with visual impairment and additional difficulties*. London: David Fulton Publishers.

Moore, Robin C. and Cosco, Nilda G. (2007) 'What makes a park inclusive and universally designed? A multi-method approach'. In Thompson, Catharine W. and Travlou, P. (eds.) *Open space: People space*. London: Taylor & Francis. pp.85-110.

Murphy, J. (1997) *Talking mats: A low-tech framework to help people with severe communication difficulties express their views*. Stirling: University of Stirling.

Murphy, J. and Cameron, L. (2001) 'Talking mats and learning disability: A low-tech communication resource to help people to express their views and feelings'. Stirling: University of Stirling.

Murphy, J. Cameron, L. and Watson (2005) 'Evaluating the effectiveness of talking mats as a communication resource to enable people with an intellectual disability to express their views on life planning'. Final report to CSO Scottish Executive.

Natu, A. and Padmavathi, P. (2006) Design of open spaces: A behavioural perspective. *Journal of architecture + design: A journal for the Indian architect*, Volume XXIII, Number 10, October.

Nind, M. (2008) *Conducting qualitative research with people with learning, communication and other disabilities: Methodological challenges*. Unpublished, ESRC National Centre for Research Methods Review Paper.

Rodgers, J. (1999) 'Trying to get it right: Undertaking research involving people with learning difficulties'. *Disability and Society*, 14 (4), pp421-433.

Silverman, D. (2006) *Interpreting qualitative data: Methods for analysing talk, text and interaction*. London: Sage Publications.

Whitehouse, S., Varni, J.W., Seid, M., Cooper Marcus, C., Ensberg, M.J., Jacobs, J.R. and Mehlenbeck, R.S. (2001) 'Evaluating a children's hospital garden environment: Utilization and customer satisfaction'. *Journal of environmental psychology*, 21. pp.301-314.

Whitehurst, T. (2006) 'Liberting silent voices – perspectives of children with profound and complex learning needs on inclusion. *British journal of learning disabilities*, 35 (1). pp.55-61.

Zeisel, J. (1981) *Inquiry by design: Tools for environment-behaviour research*. Cambridge: University Press.

Zimring, Craig M. (1987) 'Evaluation of designed environments: Methods for post-occupancy evaluation'. In Bechtel, Robert B., Marans, Robert W. and Mitchelson, W. (eds.) *Methods in environmental and behavioural research*. New York: Van Nostrand.